



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,645	01/13/2006	Liro Hietanen	3511-1003	6321
<div>466 7590 01/22/2009</div> <div>YOUNG & THOMPSON</div> <div>209 Madison Street</div> <div>Suite 500</div> <div>ALEXANDRIA, VA 22314</div>				
EXAMINER				
SLOMSKI, REBECCA				
ART UNIT		PAPER NUMBER		
2877				
MAIL DATE		DELIVERY MODE		
01/22/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/533,645

Applicant(s)

HIETANEN ET AL.

Examiner

REBECCA C. SLOMSKI

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-27, 29-39 and 41-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-27, 29-39, 41-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/22/08 has been entered.

Claim Rejections - 35 USC § 112

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **25, 29, 31, and 41** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1. With respect to claim **25**, page 3, 5th paragraph, the limitation "the symmetrical square wave signal...is configured for rectifying photocurrent signal" is not a positive limitation but rather only implies a structural limitation. The applicant is not clearly limiting the method claim to the step of rectifying the photocurrent signal with the symmetrical square wave signal. Since claim **25** is a method, the limitation of rectifying the photocurrent signal should be positively noted, affecting the method in a manipulative sense.

2. With respect to claim 35, the limitations “detector module” and “detector array” in lines 3 and 4, lack antecedent basis.
3. Claims 29, 31 and 41 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential cooperative relationships of elements, such omission amounting to a gap between the necessary structural or methodological connections. See MPEP § 2172.01. The omitted cooperative relationships are: the photocurrent converted to voltage, the photocurrent or voltage amplified, and the limitations in claim 25 and the fault detection circuit and the rest of the limitations found in claims 25 and 37. It is unclear at which point these new limitations are inserted in the previously claimed method of claim 25 or how they are related to the structure of claim 37. Although applicant has amended the claims to denote that the step occurs after rectifying the signal, there is no specific step in claims 25 and 37 wherein the signal is rectified.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 25, 26, 29, 30, 32, 33, 34, 35, 37, 38, 42, 43, 44, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuzer et al. U.S. Patent #4,937,449 in view of Preikschat et al. U.S. Patent #4,871,251.

1. With respect to claim 25, Kreuzer et al. discloses a device for the inspection of films comprising:

- Providing at least two light emitters (Figure 1, light sources 2, 2')
- Providing at least one light receiver (Figure 1, detector 3)
- Providing at least one signal generator connected to at least one of the light emitters and the at least one light receiver (Col.3, L 32-45, Col.4, L 20-25)
- Providing means for converting the received light to electrical current (Col.4, L 13-16)
- Providing a sheet of material that lies or traverses between and/or in front of at least two light emitters and at least one light receiver (Figure 1, film 1, light sources 2, 2')
- Controlling with the at least one signal generator, at least one light emitter and at least one light receiver by sending them an electronic synchronisation signal and thereby synchronises the emission and detection of light rays (Col.3, L 32-38, Col.4, L 20-25)
- Driving with the at least one signal generator, the at least two light emitters with different carrier frequencies waveforms and/or phases, and at least one light receiver with both of these frequencies, waveforms and/or phases (Col.3, L 32-45, Col.4, L 20-25)

- Emitting with the at least two light emitters emit at least two rays of light (Col.3, L 5-17)
- At least two rays of light being incident on the stationary or traversing sheet (Figure 1, Col.3, L 5-17)
- Detecting by the same light receiver at least two rays of light grazing the sheet, transparent to the sheet reflected from the sheet or directly from the light emitters (Figure 1, photo-receiver 3)
- An intensity of at least one said emitted ray of light follows the carrier waveform signal and at least one said detected light ray is demodulated from the carrier waveform signal using the electronic synchronisation signal (Col.4, L 22-25)
- Converting at least two of the rays of light to photocurrent (Col.4, L 13-16)
- A signal processed from the common carrier waveform signal is configured for rectifying photocurrent signal (Col.3, L 41-45, Col.4, L 22-25)
- Removing at least one DC component from the photocurrent signal (Col.4, L 29, impedance stage removes a portion of the photocurrent signal after it has been converted to DC)
- Diagnosing and observing the processed photocurrent and/or changes in the processed photocurrent to find defects and/or determine characteristics of said sheet of material (Abstract)

However, Kreuzer et al. fails to disclose forming a common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal processed therefrom used for rectifying the photocurrent signal.

Preikschat discloses a method for particle analysis comprising:

- Fixing a common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal is processed from the common carrier waveform signal and carries equal frequency and phase in terms of zero-crossings (Col.18, L 18-39, sync signal = common waveform, square wave = 50% duty cycle square wave signal)
- The symmetrical square wave signal processed from the common carrier waveform signal is used for rectifying photocurrent signal (Col.18, L 22-28, L36-39)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to use the common carrier waveform and symmetrical square waveform of Preikschat since the method described by Preikschat synchronises the detection circuit with the light source in order to minimize stray light effects and provide for multiple wavelengths without compromising sensitivity.

2. With respect to claim 37, Kreuzer et al. discloses a device for the inspection of films comprising:

- At least two light emitters (Figure 1, light sources 2, 2')

- At least one light receiver (Figure 1, detector 3)
- At least one signal generator connected to at least one of the light emitters and at least one of the light receivers (Col.3, L 32-45, Col.4, L 20-25)
- Means for converting the received light to electrical current (Col.4, L 13-16)
- A sheet of material is arranged between and/or in front of the at least two light emitters and the at least one light receiver (Figure 1, film 1, light sources 2, 2')
- The at least two light emitters are arranged to emit at least two rays of light incident on at least one sheet (Figure 1, Col.3, L 5-17)
- At least two rays of light grazing the sheet, transparent to the sheet or reflected from the sheet are arranged to be detected by the same at least one light receiver (Figure 1, photo-receiver 3)
- At least one ray of light is arranged to be converted to photocurrent by at least one photoelectric device (Col.4, L 13-16)
- The at least one signal generator is arranged to control at least one of the light emitters and at least one of the light receivers by sending them an electronic synchronisation signal and thereby synchronises the emission and detection of light rays (Col.3, L 32-38, Col.4, L 20-25)
- The at least one signal generator is arranged to drive at least two light emitters with different carrier frequencies waveforms and/or phases, and at least one

light receiver with both of these frequencies, waveforms and/or phases (Col.3, L 32-45, Col.4, L 20-25)

- An intensity of at least one said emitted ray of light is arranged to follow a carrier waveform signal and at least one received light ray is demodulated from the carrier waveform signal using the electronic synchronisation signal (Col.4, L 22-25)
- A signal processed from the common carrier waveform signal is used for rectifying photocurrent signal (Col.3, L 41-45, Col.4, L 22-25)
- At least one DC component is removed from the photocurrent signal (Col.4, L18-30, filter removes a portion of DC current)
- The photocurrent and/or changes in the photocurrent are arranged to be diagnosed and observed to find defects and/or determine characteristics of said sheet of material (Abstract)

However, Kreuzer et al. fails to disclose forming a common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal processed therefrom used for rectifying the photocurrent signal.

Preikschat discloses a method for particle analysis comprising:

- A common carrier waveform AC voltage signal in frequency and a symmetrical 50% duty cycle square wave signal is processed from the common carrier waveform signal and carries equal frequency and phase in terms of

zero-crossings (Col.18, L 18-39, sync signal = common waveform, square wave
= 50% duty cycle square wave signal)

- The symmetrical square wave signal processed from the common carrier waveform signal is used for rectifying photocurrent signal (Col.18, L 22-28, L36-39)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to use the common carrier waveform and symmetrical square waveform of Preikschat since the method described by Preikschat synchronises the detection circuit with the light source in order to minimize stray light effects and provide for multiple wavelengths without compromising sensitivity.

3. With respect to claims **26** and **38**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- Different rays of light from different emitters targeted to the same receiver measure different properties of the material sheet (Col.4, L 55- Col.5, L 11, wherein light emitter 2 is primarily used for defects and light emitter 2' is for film and/or coat thickness)

4. With respect to claims **29** and **30**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claim 25 above. In addition, Kreuzer discloses:

- The photocurrent is converted to voltage (Col.4, L 13-15)
- Photocurrent or voltage is amplified (Col.4, L 13-16)

However, Kreuzer in view of Preikschat fails to specifically disclose the conversion and amplification after rectifying. It would have been obvious to one of ordinary skill in the art at the time of the invention that it is a matter of design choice and would be simple enough to convert and amplify the photocurrent before or after current rectifying since this would enable the raw signal to be subject to rectifying then a more accurate result after amplifying the already rectified signal.

5. With respect to claim 31, Kreuzer in view of Preikschat discloses all of the limitations as applied to claim 25 above. In addition, Kreuzer discloses:

- The resulting photocurrent or a voltage converted from a photocurrent is fed into a fault detection circuit (Col.4, L 13-36, L 59- Col.5, L 5)

The limitations in claim 31, 2nd paragraph-5th paragraph, “means for summing 820, 823,... measurement and inspection method” are not entitled to weight in the method claims since the recited structure limitations herein must affect the method in a manipulative sense and not to amount to the mere claiming of the structure (or means for) performing a particular method. The claim language does not include performing the steps of summing, resetting the circuit, or generating digital defect signals, but rather only a structural means for doing so.

6. With respect to claim 41, Kreuzer in view of Preikschat discloses all of the limitations as applied to claim 37 above. In addition, Kreuzer discloses:

- The resulting photocurrent or a voltage converted from a photocurrent is fed into a fault detection circuit (Col.4, L 13-36, L 59- Col.5, L 5)

- Means for summing a positive or negative threshold voltage value to the voltage signal entering the fault detection circuit (Col.4, L 59-68, threshold value obtained from uncast film)
- A low pass filter signal path (Col.4, L 20-22)
- Means for resetting the circuit (Col.4, L 67, calibration indicates resetting to null)
- Means for generating digital defect signal pulses when analog defect signals exceeding preset threshold values are produced by demodulation or synchronised detection circuitry of the measurement and inspection arrangement (Col.5, L 2-5)

7. With respect to claim 32 and 42, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- The sheet material is film (Abstract)

8. With respect to claim 33 and 43, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- The location and/or size of at least one defect and/or other attribute of at least one defect and/or sheet thickness, reflectivity or other physical attributes of the sheet are derived from said optical measurements (Abstract, Col.5, L 6-11)

9. With respect to claim 34 and 44, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- One or more defects that feature aspects of the following: holes, pinholes, scratches, spots, stains, cracks, edge faults, streaks, surface faults (Col.5, L 6-11)

10. With respect to claim 35 and 45, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer discloses:

- At least one light detector comprises at least one photoelectric device or wave guide (Figure 1, photo-receiver 3, pin diaphragm 4)

11. With respect to claims 36 and 46, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above.

However, Kreuzer in view of Preikschat fails to disclose the signal generator drives at least two light receivers with different carrier frequencies, waveforms, and/or phases.

It would have been obvious to multiple the single detector of Kreuzer as two light receivers since the light receivers of claims 36 and 46 are not noted for any particular purpose and one of ordinary skill in the art would understand the benefit of having multiple receivers driven at different characteristics in order to provide a larger data set of measurements, giving more freedom to the application and more accuracy by using the results from each receiver in a comparison.

Claims 27 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuzer et al. U.S. Patent #4,937,449 in view of Preikschat U.S. Patent #4,871,251 and further in view of Kobayashi et al. U.S. Patent #5,245,671.

12. With respect to claims **27** and **39**, Kreuzer in view of Preikschat discloses all of the limitations as applied to claims 25 and 37 above. However, Kreuzer et al. fails to disclose the three-dimensional structure of a defect is detected with more than one beams.

Kobayashi et al. discloses an apparatus for inspecting circuit boards comprising:

- The three dimensional structure of a defect is detected with more than one beams (Col.2, L 15-34)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to include more than beam for inspection as in Kobayashi et al. in order to detect the three-dimensional structure of a defect since it was well known in the art that three-dimensional defect sensing is performed by a plurality of irradiation directions (Kobayashi et al, Col.2, L 24-26) and to be able to determine the three-dimensional structure of a defect would be desirable in order to classify and repair the defect, steps that would save time and repeated errors.

Response to Arguments

13. In applicant's response, applicant notes on page 12, second paragraph that claims 36 is canceled without prejudice. However, in the currently amended copy of claims provided on 10/22/08, claim 36 stands and is not noted as having been canceled. Clarification is necessary.

14. Applicant's arguments, see page 12, with respect to objection of claims 29, 36, and 46 have been fully considered and are persuasive. The objection to claims 29, 36, and 46 has been withdrawn.

15. Applicant's arguments, see page 12-13, with respect to rejection of claims 25, 29-31, 34, 41 and 44 under 35 USC 112 have been fully considered and some are persuasive. Some of the rejections have been withdrawn; however, some of the rejections have not been addressed. Mainly, the rejection of claim 35 as lacking antecedent basis as noted above, and the rejection of claims 29, 31, and 41 since the step of rectifying is not clearly set forth in independent claims 25 and 37. Thus the clarifying amendment made to the claims that the steps occur upon or during rectifying the signal, does not clarify the method steps, since it is unknown precisely when rectifying occurs.

16. Applicant's arguments, see pages 15-19, with respect to the rejection of the claims under 35 USC 103 over Kreuzer in view of Preikschat have been fully considered but are not persuasive.

17. First, applicant argues that Kreuzer fails to disclose the common carrier waveform AC voltage signal is fixed and a symmetrical 50% duty cycle square wave signal is processed from the common carrier waveform signal and carries equal frequency and phase in terms of zero-crossings and the symmetrical wave signal processed from the common carrier waveform signal is used for rectifying photocurrent signal. The examiner agrees that Kreuzer fails to disclose these limitations and for this reason relies on the combination of Preikschat for these

teachings. Preikschat does not only disclose a system that contains no electrical components, but rather this is only one of the embodiments in Preikschat's disclosure, an embodiment not relied on for this rejection. Additionally, the applicant argues that since Preikschat's invention is interested in changing the focal spot, Preikschat would render Kreuzer inoperable with no motivation to combine them. However, the focal length changing of Preikschat is equivalent to the thickness changing of the sample of Kreuzer since both move the distance to the surface. Additionally, Preikschat is being relied on for the processing of signals needed for accurate measurements both in Preikschat and desirable in Kreuzer. Both are interested in measuring reflected light beams for a phase change. Preikschat provides a simple, effective method to calculate the distance to the surface and defects thereon using a common carrier waveform and symmetrical 50% duty cycle square wave in order to synchronize the measurements, a characteristic that is easily applied to the like measurements being taken in Kreuzer. For this reason, the argument is not persuasive and the rejection is maintained.

18. Additionally, the applicant argues that Kreuzer fails to disclose a DC component removed from the photocurrent signal. However, Kreuzer does disclose this DC component being removed, if not explicitly, in a way as to be understood by those of ordinary skill in the art. Kreuzer discloses filtering the signal to remove the outlying signals, adjusting the region of sensitivity. In this step, a portion of the DC component is removed from the photocurrent signal. For this reason, the argument is not persuasive and the rejection is maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to REBECCA C. SLOMSKI whose telephone number is (571)272-9787. The examiner can normally be reached on Monday through Thursday, 7:30 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. G. Lauchman/
Primary Examiner, Art Unit 2877

Application/Control Number: 10/533,645
Art Unit: 2877

Page 17

Rebecca C. Slomski
Patent Examiner

rCS